Effects of Design on Health and Wellbeing
The 6th International Conference on Architecture, Research, Health, and Care
Aalto University, Finland, 17-19 June 2024

EFFECT OF ROBOT INTERVENTIONS FOR SUPPORTING PEOPLE WITH FRAILTY INSIDE REAL BUILT ENVIRONMENTS

Evangelia Chrysikou[1], Fernando Loizides[2], Jane Biddulph[3] , Helen Hobbs[4] , Nathan Jones[2], Eleftheria Savvopoulou[5]

[1] The Bartlett School of Sustainable Constructon UCL, United Kingdom, e.chrysikou@ucl.ac.uk
[2] School of Computer Science and Informatics, Data Science Academy, Cardiff University, United Kingdom, LoizidesF@cardiff.ac.uk
[3] Research Department of Epidemiology and Public Health, UCL, United Kingdom, jane.biddulph@ucl.ac.uk
[4] Hobbs Rehabilitation Intensive Neurotherapy Centre, United Kingdom, helen@hobbsrehabilitation.co.uk
[5] SynThesis Architects, Greece, syn-thesis@hotmail.com

Background

The implementation of robots for old people is mainly limited to devices such as automatic vacuum cleaners, voice assistance or are used to support mainly exercise and companionship.

Robotics aiming to support people with frailty are usually tested in labs without real built environment (BE) considerations. For example, in Image 1 are the robots currently tested in the Robot Lab – University of Hertfordshire. To our understanding, most are not suitable for home use and have very little to offer to people with frailty. They might even create additional practical problems and even expose people to hazards, such as tripping (Image 1).

Image 1. Robots at the Robot Lab, University of Hertfordshire. Miro-E (the 'dog' at the right-down image) it's too small and could expose people to hazards such as tripping.

Taking into account the physical barriers one meets in a real residential setting and how this could affect the robot-frail people cohabitation, this research project supports digital innovation industry in reaching their potential, while in parallel people in need could be benefited by living a more independent life at their own space.

The project brings together expertise from healthcare architecture and BE, human-computer interaction, population health and clinical practice.

Methods

Methodology includes focus groups with health professionals, architectural auditing of frail people's residential BE, simulation of robot suitability within the frail persons residential BE and trial testing of selected robots for comparison with simulated data.

Results

By observing the physical factors of the robot movements and interaction needs with the resident, the project aims to uncover requirements that identify how cohabitation creates accessibility limitations from the technological perspective.

Here we illustrate a real independent living flat where someone will frailty is expected to move in.

We explore three different use case scenarios, with different furniture configurations (Image 2).

All demonstrate limitations in space and movement:

- Spaces are too small
- they need to have furniture for additional support for people not to or as they fall and furniture for everyday life and storage.
- Robots require additional space as a buffer to manoeuvre
- There is a conflict between the space that the robots need and the more narrow paths that a person will frailty needs.

Image 2. Different resident (up row) and Pepper Robot (down row) movement scenarios in a flat for assisted living.

Conclusion

Putting people with frailty and robots inside real BE can create difficulties that have been, so far, unexplored, preventing technologies from reaching their full potential. This project addresses this issue.
We need a unified framework on people with frailty-robot co-habitation, taking into account the needs of the user, the robot characteristics but also the residential and care BE parameters as well.

Acknowledgments

This research project is funded by The EMERGENCE Healthcare Technologies Network+ Robotics for Frailty Challenge funding call for the proposal 'I need help but my robot can't get down the stairs', at the Bartlett School of Sustainable Construction UCL in collaboration with Cardiff University.

Join: Evangelia Chrysikou PhD
Like: Evangelia Chrysikou
Follow: Evangelia Chrysikou
Talk: synthesislia
E: e.chrysikou@ucl.ac.uk
M: +44 7827 571927